



Diverse perspectives of cat owners indicate barriers to and opportunities for managing cat predation of wildlife

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Policy proposals to address predation of wildlife by domestic cats (*Felis catus*) include reducing cat populations, regulating ownership, educating owners, and restricting cats' outdoor access. Such proposals rarely account for cat owners' perspectives, however, and are frequently met with strong, principled opposition. We conducted a Q-methodological study to investigate the views of domestic cat owners in the UK on the roaming and hunting behaviors of their pets. We identified five distinctive cat-owner perspectives: (1) Concerned Protectors focus on cat safety, (2) Freedom Defenders prioritize cat independence and oppose restrictions on behavior, (3) Tolerant Guardians believe outdoor access is important for cats but dislike their hunting, (4) Conscientious Caretakers feel some responsibility for managing their cats' hunting, and (5) Laissez-faire Landlords were largely unaware of the issues surrounding roaming and hunting behavior. Most participants valued outdoor access for cats and opposed confinement to prevent hunting; cat confinement policies are therefore unlikely to find support among owners in the UK. To address this conservation challenge, we argue that generic policies will be less effective than multidimensional strategies offering owners practical husbandry approaches that are compatible with their diverse circumstances, capabilities, and senses of responsibility.

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Environmental impacts of domestic cats (*Felis catus*; hereafter, “cats”) are the subject of international conservation concern and policy debate. Cats can pose a threat to biodiversity conservation (eg through predation or hybridization: Medina *et al.* 2011, 2014; Loss and Marra 2017), and are also susceptible to a range of diseases (including zoonoses like toxoplasmosis and rabies); as such, they may also be a hazard to public and animal health (Gerhold and Jessup 2013; Taggart *et al.* 2019). Feral cats, which are neither controlled nor provisioned by humans (Crowley *et al.* 2020), are the frequent subject of conservation policy and action, but globally most domestic cats have owners and/or are closely affiliated with people. For such cats, policy recommendations have included implementing population control, regulating ownership and management, and educating owners about impacts (Calver *et al.* 2011; Loss and Marra 2017; Escobar-Aguirre *et al.* 2019). Authoritarian approaches to policy, or those addressing a perceived knowledge deficit, can often be problematic. Such approaches assume that the primary reason that owners fail to regulate their cats' behaviors is a lack of understanding about the associated impacts, but this is unlikely. Attempting to advance policies prioritizing the values of conservation advocates over those of cat owners produces divisions between these (not mutually exclusive) groups. Such divisions can escalate into conflict, characterized by distrust, animosity, and communication breakdown (Redpath *et al.* 2013; Crowley *et al.* 2017). Emergence of conflict on this issue is apparent in scientific and popular discourse

(Loss and Marra 2018; Lynn *et al.* 2019; Strycker 2019), compromising progress in developing effective policy. One emerging alternative approach is to recognize cat owners as key partners in reducing cat impacts (Crowley *et al.* 2019); engage with owners to understand their priorities and perspectives (Macdonald *et al.* 2015; McLeod *et al.* 2017; Linklater *et al.* 2019); and collaborate with owners and other stakeholders to develop effective, sustainable policy and guidance (McLeod *et al.* 2015, 2019; Crowley *et al.* 2020). We analyzed the perspectives of cat owners in the UK on the management of domestic cat roaming and hunting behaviors, and identified multiple, distinct owner perspectives, several of which are consistent with willingness to manage cat behavior, others less so. Consideration of stated values and normative beliefs associated with each perspective highlights both promising opportunities for – and important barriers to – managing cat predation of wildlife.

Methods

Q-methodology was used to examine the perspectives of cat owners. This approach relies on qualitative and quantitative techniques to explore and differentiate between subjective views on an issue (Watts and Stenner 2012), and is increasingly being applied to conservation problems that involve complex social dimensions (Zabala *et al.* 2018). The first step of the Q-methodology process was to identify the full spectrum (“concourse”) of views on cat behavior and management. We had previously interviewed 48 cat owners in the UK about the roaming and hunting behavior of their cats, and whether, why, and how they manage this behavior (see Crowley *et al.* [2019]

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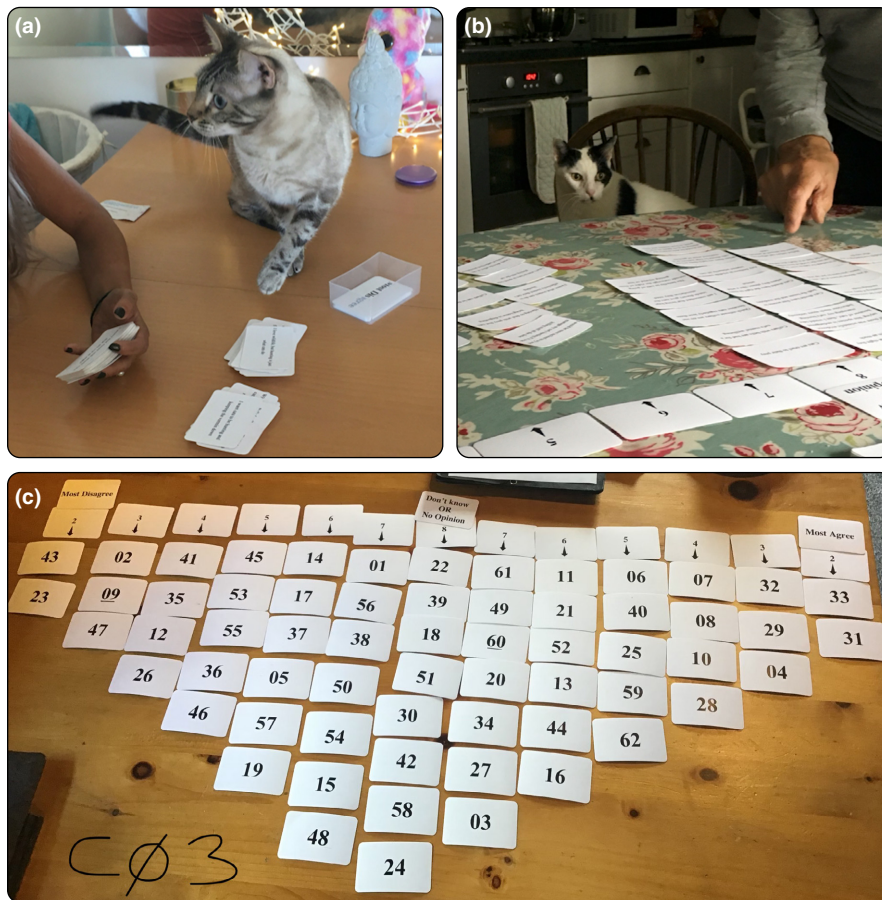


Figure 1. The Q-sorting procedure, with assistance from several cats. (a) Participants read each of the 62 statements and place each statement card into one of three piles (“agree”, “disagree”, and “neutral”); (b) participants then arrange the statement cards in relation to a constrained distribution from “most agree”, through “neutral”, to “most disagree”; (c) a completed Q-sort, with cards turned over to show unique statement numbers on the reverse side. The alphanumeric code C03 in the lower-left corner (written over the photograph) is a participant ID code.

for a full account). On the basis of those interviews, as well as letters to the editor published in newspapers (LexisNexis search of UK newspapers 2000–2017: “cat”/“domestic cat” AND “wildlife”, 15 Jun 2017), we compiled a total of 157 preliminary “statements” on cat owner perspectives. From those statements and upon further refinement (for details, see doi.org/10.5281/zenodo.3755683), a final 62 statements (the “Q-set”: WebTable 1) were selected. Participants in the Q-method exercise (described below) would then rank these 62 statements. Predation of wildlife is not the only environmental challenge associated with roaming cats, but we focused on hunting behavior as this was by far the most salient issue raised in our previous 48 interviews. We additionally included one statement (statement 36) to ascertain participants’ concern about disease transmission, but we excluded statements about hybridization because native wildcats (*Felis silvestris*) are absent from the part of the UK covered in this study.

Participants in the Q-method exercise were drawn from two regions of England, including both rural and urban areas

(WebTable 2). To encompass diverse views, we used multiple purposive methods to recruit participants, including advertising via leaflets, email lists, and Facebook, and then targeted underrepresented groups (eg farmers, pedigree cat breeders). Our study received ethical approval (University of Exeter 2017/2058), and participants provided informed consent. The 56 participants carried out a “Q-sort” exercise: each participant ranked all 62 statements of the Q-set, printed on cards, according to the degree with which they agreed or disagreed with each statement (Figure 1), and organized them into a constrained array (Figure 2). Completed Q-sorts were then photographed. Brief follow-up interviews and questionnaires were also conducted (doi.org/10.5281/zenodo.3755683).

We analyzed all completed Q-sorts using principal component analysis with varimax rotation in the R package *qmethod* (Zabala 2014). We applied statistical and theoretical criteria to determine the appropriate number of factors to extract and accepted five factors that explained 57% of the variance (WebTable 1; doi.org/10.5281/zenodo.3755683). Q-sorts of participants whose views were significantly associated with each factor were flagged automatically and used to calculate a weighted mean (*z* score), reflecting the relative position of each statement within a factor. The views of nine participants were not significantly associated with any factor, and those participants were excluded from further analysis. *Z* scores were then used to reconstruct “ideal” Q-sorts

for each of the five factors (“factor arrays”; WebTable 1). We followed Watts and Stenner’s (2012) systematic method of factor interpretation to explore and build descriptions of the five factors or perspectives.

■ Results

In the following descriptions, numbers in parentheses indicate the statement number and the factor array score and should be read alongside WebTable 1. For example, for Factor 1, (33+6) indicates participants associated with Factor 1 agreed most strongly (+6) with statement 33, “I worry about roaming cats being lost, stolen, or killed by traffic”. Each description is preceded by an illustrative quote from a participant associated with that factor. Figure 3 highlights key statements and sentiments (composites of similar statements) associated with each perspective on roaming, hunting, and management.

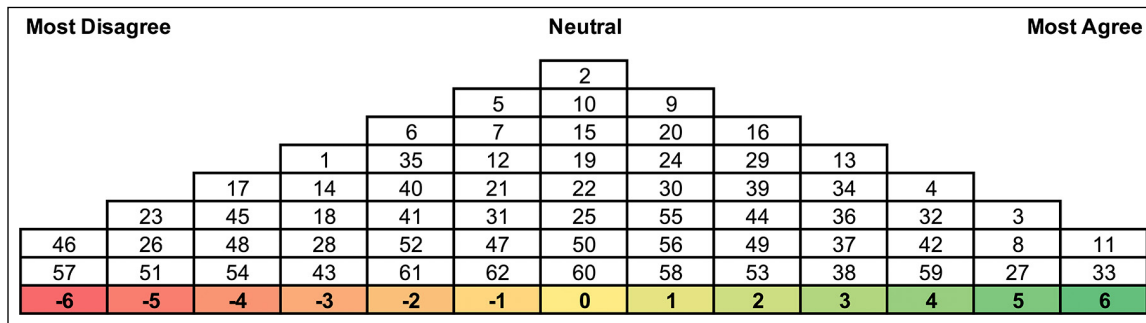


Figure 2. Constrained distribution for the sorting exercise. Participants were required to arrange all 62 statements in this pattern, guided by indicator cards. The statement numbers in this example indicate the “ideal sort” for Factor 1: Concerned Protectors. See WebTable 1 for statement wording and Figure 1c for a photographic example.

Factor 1: Concerned Protector (cats as cherished dependents)

“I want to know when I go to bed, that my cats are safe. But then, I think of them as being part of the family; they are not just ‘the cat’”
(Participant 32)

Participants associated with Factor 1 ($n = 13$) reported anxieties about roaming cats being lost, stolen, or killed by traffic (33+6), and would feel guilty if their pet were to be killed while roaming (3+5). They were concerned that roaming cats were at risk of being hurt by people, diseases, and other animals (32+4; 36+3; 37+3). Cats might be kept indoors overnight, or permanently, to keep them safe (11+6; 27+5), and confinement was acceptable if owners provided stimulation (8+5; 1-3; 57-6). Cats raised indoors or with restricted outdoor access were accustomed to such a lifestyle (4+4). The benefits of going outside did not necessarily outweigh the risks of cats being injured or lost (47-1; 15=0). These owners did not express strong feelings about hunting (55+1; 9+1; 5-1; 31-1; 7-1), did not consider hunting a nuisance (54-4), tended to believe that hunting is “just what cats do” (34+3), and did not think cats should be kept indoors specifically to prevent them from hunting (17-4). In addition to not opposing restricting outdoor access, these owners did not perceive collars as problematic (45-4; 48-4).

Factor 2: Freedom Defender (cats as autonomous predators)

“I like to have cats that are out free, doing what they want to do. If they catch animals, great. If they don’t, that’s fine as well”
(Participant 12)

Participants associated with Factor 2 ($n = 12$) believed cats should roam where they pleased, “like a wild animal” (50+6), and have outdoor experiences (24+6). Being kept inside did not provide cats with necessary stimulation (1+5; 8-4) and might be cruel (57+2). They were unconvinced about keeping cats inside at night (27-2), or that cats raised indoors became

accustomed to being indoors (4-2). They were the least concerned about the risks of roaming (33+1; 3=0; 32+1; 36=0; 37=0), and believed these risks were outweighed by the benefits (47+4; 15+3). Hunting was broadly positive because it controlled rodents (7+4; 31+2) and indicated a normal, healthy cat (49+5; 29+3). These owners were not bothered by hunting (5+2) and expressed some pride in their cats’ hunting prowess (28+2). They strongly opposed restrictions, including bans on cat ownership (14-5) and keeping cats inside (17-6; 22-5). They believed owners could not stop (55+3) and had no responsibility to manage (60-4; 53+4) hunting.

Factor 3: Tolerant Guardian (cats as wild companions)

“I don’t want my cat to be hunting; I’d rather she didn’t hunt. But I am aware that she is a carnivorous wild creature”
(Participant 28)

Participants associated with Factor 3 ($n = 12$) believed cats should have outdoor access (24+4; 58+1; 50+2), but did not want an “outdoor only” cat (38+6) and considered overnight confinement acceptable (27+3). On balance, they felt the benefits of roaming outweighed the risks (47+5; 15+3; 3=0), but worried about safety (33+3; 32+2). Hunting was the least attractive aspect of cat ownership (43+3); they disliked hunting (28-6; 31-4; 5-3; 35+1) and would make concerted efforts to rescue prey captured by their cats (42+6). They loved wildlife and did not like their cats causing animal suffering (39+4; 21-3), but felt strongly that hunting is “just what cats do” (34+5). Although inclined toward expending greater effort to manage behavior if their cat began hunting prolifically (40+3), they did not know how to reduce hunting (61-4; 56+1; 20=0; 19-1) without restricting roaming, which they were unwilling to do (17-5; 22-3).

Factor 4: Conscientious Caretaker (cats as challenging carnivores)

“I understand that hunting is a natural behavior but I’m very sure there are ways you can discourage that”
(Participant 5)



Figure 3. Summary of factors (perspectives) identified from the analysis. Each of the five factors is illustrated with three associated statements, or “sentiments” (composites of similar statements), which relate to each group’s key views on (a) roaming and outdoor access, (b) hunting behavior, and (c) cat management. The statements and sentiments chosen statistically distinguish that factor from at least one other factor, were ranked highest/lowest by that factor as compared with other factors, or both. For more detailed summaries, see the Results section. Image credits (from left to right): S Ross/Flickr (CC-BY-SA-2.0); Pixabay; S Hanafin/Flickr (CC-BY-SA-2.0); Rosino/Flickr (CC-BY-SA-2.0); Wikimedia Commons.

Participants associated with Factor 4 ($n = 7$) also believed that cats require outdoor access (58+4; 24+4; 17–6) but did not express opposition to confinement (57+1; 4=0; 27=0). They worried about roaming (33+3), but believed benefits outweighed risks (15+4; 47+2). Hunting bothered these owners (5–5), particularly impacts on birds (6+6; 21+5). They thought seriously about cat depredation of wildlife (2–5; 9–4) and believed that a single cat could be harmful (12–4). They were aware of wider concerns about cats (10+3), were likely to believe owners were responsible for managing hunting (60+2; 53=0), and were confident in their knowledge about hunting-control measures (61+1; 56+3), while expressing uncertainty about the effectiveness of interventions (19=0; 52–5). They would be more inclined to intervene if given scientific evidence of impacts (25+4) or if their cat were a voracious hunter (40+5). Adherents to this view were least opposed to restrictions on ownership (14–1), but still did not think cats should be confined simply to prevent hunting (17–6; 22–2).

Factor 5: Laissez-faire Landlord (cats as houseguests)

“[Hunting] just never ever crossed my mind, and my cats have not brought a bird in so that’s probably why” (Participant 21)

Participants associated with Factor 5 ($n = 3$) did not believe keeping cats indoors was cruel (57–3) or that cats required outdoor access (58–1), but thought cats benefited from being outdoors (47+3). They worried cats might be lost, stolen,

or killed by traffic (33+5), but perceived these risks as natural (15+4) and were not concerned about other threats, such as disease or people causing them harm (32–3; 36–4). These owners, when they first acquired their cat, did not really consider whether it would hunt (9+4), and had never seriously thought about the effect of cats on wildlife (2+6). Because they had hardly considered it, such owners had no strong feelings about hunting behavior (5+1; 43+1; 49=0; 31=0). However, they did not like the idea of their cat causing suffering (39+3), and would be more inclined to intervene if their cat were a prolific hunter (40+6) or if there were evidence of specific impacts (25+5). They did not think that cats should be kept inside to stop hunting (17–5) but perceived belled collars as an effective, low-risk means of managing hunting (56+4; 30–6; 48–4).

Discussion

We identified several clear but contrasting priorities among cat owners that provide insight into the likely effectiveness of engaging these key actors with different policy options for dealing with the contentious issue of cat impacts on wildlife. For instance, Concerned Protectors did not express strong views on hunting, but rather prioritized cat safety and were willing to regulate cat activities to prevent them from harm. The Canadian coalition Keep Cats Safe and Save Bird Lives (<https://catsandbirds.ca>) argues that preventing cats from roaming benefits both cat welfare and wildlife

conservation. Owners motivated to confine their cats for safety reasons may also limit their capacity for hunting, which may garner broader support than regulation solely for wildlife conservation. This approach to conservation policy therefore aligns well with the values of Concerned Protectors. In stark contrast, Freedom Defenders prioritized outdoor access and were accepting of or even positive about hunting. These owners strongly disagreed with any regulation of cat ownership or outdoor access, indicating they would actively oppose restrictive policies. They would be the least likely to manage their pets' hunting. Indeed, for some, this would contradict the purpose of having cats in the first place, given that pest control is still a common reason for cat ownership in rural areas, and so effective policy needs to recognize the priorities and values of people with "working" cats. Tolerant Guardians also prioritized outdoor access, but these owners disliked hunting. They were not concerned about wildlife populations per se but were motivated to intervene, perhaps most strongly by prevention of prey animal suffering. This perspective was associated with uncertainty about the effectiveness and welfare implications of interventions, and this group would benefit most from clear, accessible guidance on how to reduce killing and associated suffering. Conscientious Caretakers preferred their cats to have outdoor access but were explicitly concerned about effects on wildlife, particularly birds. They were the most likely to manage their cats to reduce hunting and felt some responsibility to do so. This group might be engaged either as citizen scientists, helping to develop and promote effective management techniques, or as champions of extended concepts of responsible pet ownership that include responsibility for a cat's ecological "pawprint" (see also Crowley *et al.* 2019, 2020; Escobar-Aguirre *et al.* 2019; Linklater *et al.* 2019). Laissez-faire Landlords showed no strong preferences regarding outdoor access and rarely considered the effects of hunting. They may be unaware of, or simply disinterested in, issues surrounding roaming and hunting behavior, and indeed other aspects of cat ownership. As such, they may be more open to discussions about management than those with strong, existing viewpoints, but because of their lack of prior interest, they may also be the most difficult to engage initially. These cat owners are unlikely to seek management advice or invest in implementation, but their awareness and acceptance of belled collars suggests they may be receptive to prominent, coherent messaging promoting straightforward management options.

Across the diverse perspectives manifest among cat owners in the UK, provision of outdoor access is currently considered a fundamental, or at least default, component of cat husbandry. Three of the five perspectives we identified felt strongly that cats should be permitted outdoor access, and all five disagreed that cats should be kept inside solely to stop them hunting. This, combined with concerns about the health and welfare implications of keeping cats indoors (Alho *et al.* 2016), may limit the success of messaging or policies advancing confine-

ment as a primary means of preventing predation. However, the diversity of views on cat confinement indicates that this debate is ongoing among cat owners, and could shift as cultures of pet-keeping change and new knowledge is produced. Support for allowing cats to roam does not mean that owners are unconcerned about hunting or unwilling to consider other measures to mitigate hunting; indeed, four of the perspectives (Freedom Defender being the exception) viewed hunting negatively, suggesting that a majority of cat owners might be interested in or accepting of reducing predation by some means.

Identifying, refining, and promoting viable management tools and alternatives may be a more constructive approach to resolving this issue than regulation. In the UK at least, blanket restrictions are likely to be resisted, leading to greater likelihood of conflict. There is therefore a need to explore, and increase the effectiveness of, multiple strategies for reducing predation by cats, including both direct (eg collar-mounted devices, managing outdoor access) and indirect (eg making home environments more attractive to cats through physical and behavioral enrichment, assessing the effects of nutrition and feeding routines on hunting behavior, selectively breeding for reduced hunting and roaming [Bradshaw 2013]) measures. The latter techniques may be particularly appealing to cat owners because they are associated with fewer welfare concerns and could in fact benefit cat health and welfare. Four of the five perspectives agreed that breeding of cats should be regulated, suggesting that humane strategies for reducing cat populations would receive broad support.

While application of a Q-methodological approach aids in the identification and description of different perspectives, it is not well suited for determining how these perspectives are distributed among wider populations of cat owners, nor can we yet identify demographic or other characteristics associated with cat owners adhering to each perspective. Future research will build on our findings by identifying the prevalence of each perspective among a large, representative sample. There are also cultural variations in people's approaches to these issues (Hall *et al.* 2016). For instance, in sharp contrast to the UK, there is strong public concern in Australia about the impacts that domestic (and especially feral) cats have on native wildlife (Hall *et al.* 2016; Travaglia and Miller 2017), and several Australian states have introduced cat management strategies that include compulsory registration and containment in some regions (ACT Government 2019; DEPIPWE 2017). Nevertheless, research has also identified ambivalence in Australian cat owners' attitudes toward 24-hour containment or restrictions on ownership (Toukhsati *et al.* 2012; McLeod *et al.* 2015; Travaglia and Miller 2017). It would therefore be valuable for the study presented here to be repeated elsewhere, using a similar set of statements, with adjustments to account for socioecological context.

Although sharing information about the effects of cats on vulnerable wildlife populations can play a role in alerting people who have not previously considered this aspect of cat ownership, such messaging should maintain a constructive tone

and focus on how people might reduce their pets' impacts as opposed to demonizing cats or cat owners. Meaningful engagement with cat owners, and recognition of both their collective priorities and diverse views, will be vital to implementing sustainable management of hunting behavior in cats.

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